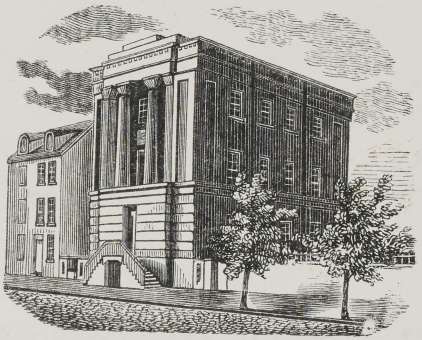
AN ESSAY ON

# Respiration

RESPECTFULLY SUBMITTED TO THE FACULTY OF THE



## HOMŒOPATHIC MEDICAL COLLEGE

OF PENNSYLVANIA,

*On the 30th. day of January, Eighteen Hundred and Fifty-six.*

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*Of Philadelphia.*

We are taught by Physi-
ologists that the continued Respi-
ration of an Atmosphere charged
in an inferior degree with excreta-
tions from the Lungs & Skin is a-
mong the most potent of all the
predisposing causes of disease.
That the presence of even a small
percentage of Carbonic acid in
respired air, is sufficient to
cause a serious diminution
in the amount of Carbonic acid

thrown off, and of the oxygen absorbed, it follows that those oxydating processes which minister to the termination of effete matter from the system, must be imperfectly performed, and that an accumulation of substances tending to putrescence must take place in the blood. Hence there will probably be a considerable increase in the amount of such matters in the pulmonary and cutaneous exhalations; and the renewed air will become changed, not only with carbonic acid gas, but also with matter in a state of decomposition, and of course defeat the chief ends of Respiration in its healthy functions.

The left ventricle of the heart, sends the blood through the medium of the Arteries, to all parts of the system, for its sustenance. In its Course, it passes through many organs, each of which has a specific function to perform in carrying on the laws of life:— The liver secretes bile; the kidneys, urine; the glands of the mouth, saliva; and so all in their turn receive a portion, and take different parts from the blood.

This is done while the blood is passing the Capillaries, which constitute the connection between the arteries and the veins. This separation of different qualities of the

blood by the different organs, is effected through the medium of the nerves of organic life or the insensible sensibility of Bichat.

The blood, when it leaves the heart and enters these organs, is of a red or dark color, very warm, and loaded with the elements for the sustinance of the whole body. But in its passage through the different parts of the system, the oxygen, which is the reddening and warming ingredient, together with the nutritious particles, are abstracted, leaving the temperature of the blood low, and its qualities impoverished. It has now received a poisonous and chilling principle from the system, called carbon, which

blackens it, and unless it unfit to nourish and sustain the body. Hence the reason why the blood in the arteries is red and warm, while the blood in the veins is black and not warm, and hence too the necessity for its circulation and its re-in-vigorment.

In the accomplishment of this vital consideration, the blood travels back through the veins, until it reaches the right side of the heart. From there it is thrown into another receptacle on the same side, where it passes into certain vessels, called the pulmonary arteries, by which it is carried to the lungs - the numberless air vessels or cells of which they are composed, there bringing it

by an exceedingly thin tissue, almost in contact with the air, which instantly takes up the carbon, and in exchange gives back the amount of oxygen required. The blood then returns to its starting point in the left side of the heart, whence it is again thrown into the system, in a proper condition to minister to its wants. This impoverishment and enrichment of the blood is going on constantly and simultaneously in the well balanced system.

The process and design of Respiration, now apparent, we will look at the laws that control these functions. This knowledge is important so far as it will enable us to

administer to Tissue wants and restore them when they become diseased,

These vital functions are under the influence and control of Philosophical, Chemical and Mechanical laws, that must be enforced and rigidly obeyed, in order to secure the object of life.

The structure and character of the Lungs may be illustrated by a reference to the Sponge:- When we examine this article in a dry state, we see a small substance, quite compact, looking porous, though we can see no tubes or cells passing through it. But when immersed in water

it enlarges and becomes full of these tubes or cells, some of them the size of a grain of sand. Now, how has this happened, seeing that these cells have not been made since its immersion? Why, evidently the absorption of the water has separated the fibres of the sponge, and enlarged the whole mass.

It will be seen also, that the walls of the invisible pores are passively and mechanically drawn apart, mathematically increasing the diameter of the cells.

Of course, the expansion of any porous body enlarges its dimensions, and gives it a corresponding receding and condensing

ability. This ability is only a passive condition. It is not an inherent quality of this porous condition.

The application is obvious; for, at the birth of a child, the lungs are small and comparatively compact, having no large cells or tubes, and no circulation, but that which is designed for nourishment, which is considerable. In this respect, the lungs are much like the dry Sponge, the cells being in close contact with them, through the pressure of the surrounding atmosphere.

Previous to this the infants blood has been purified

by its mother, but now removed into independent life, it must purify its own blood or die. But how can its life be prolonged, when the walls of the arteries are collapsed, and there are no longer any tubes or cells through which the air may freely pass, to produce the necessary change in the blood? The Sponge is now dry, and its whole substance contracted. Nor can the cells of the lungs be expanded by the power of the heart, because, by the influence of the atmospheric pressure on the Diaphragm and ribs are continually pressed upon the lungs, thus resisting the

heart's contraction. The arteries shut up at the very outset, and the important process cannot even begin, for want of capacity in the arteries. The lungs is physical, not vital, so that there must be a change before any advancement can be made. In other words, it is evident that the lungs must first be expanded before they can receive the blood.

Inspiration, then with all its necessary attendants, must begin to open the arteries for the admission of the blood. Inspiration is the first act of independent life, this failing, there can be

no Organised existance.

By the power of the Divine Architect, the child breathes as soon as born. Simultaneously, then with the drawing of the first breath, the intercostals shorten themselves, drawing up the ribs, and expanding the chest, while the diaphragm shortens its fibres, and draws itself down, its surface flattened, and increasing the perpendicular dimensions of the chest.

At the instant that this vacuum occurs, the atmosphere rushes into the lungs and fills the cells, expanding them so as that they compress the Diaphragm and ribs as much as when collapsed.

This is Inspiration, and it has
effected the expansion of the
lungs and arteries, together with
the required supply of vital air.
This is now the condition of the
wet sponge. An unobstructed entrance is now afforded for
the vital element of life, the
blood; the cells are spread out
wide, expanding or exposing
a surface and enabling the
blood to follow up directly to
the air, where it is purified,
the capillary vessels being enlarged
to their utmost capacity, thus
facilitating the passage of the
blood through them into the
veins

The blood now purified,
it is necessary that it should pass

along back to the heart, for distribution, and make way for a succeeding quantity of impure blood, to undergo the same process, and so on, in one endless round, the whole action of life is accomplished on Nature's grand scale - immutable in all its wonderful bearings on the laws of vitality and life.